



Restorative Lake Sciences, LLC

July 11, 2021 (Amended July 14, 2021)

Attn: Mr. Chet Janik, Leelanau County Administrator
8527 E. Government Center Drive
Suite 101
Suttons Bay, Michigan 49682

Dear: Mr. Janik,

Restorative Lake Sciences, LLC is pleased to present this scope of work for the completion of a comprehensive and objective Lake Leelanau ecosystem assessment and feasibility study to be completed by August 15, 2021. Elements and deliverables of the assessment are discussed below along with our scientific expertise that we hope to provide to the Lake Leelanau community. We know that our team is the most qualified group of lake experts to responsibly and objectively create a lake feasibility study for Lake Leelanau for the following reasons:

- 1) Many of our staff have advanced degrees in limnology (lake science) and also have extensive experience with restoration and management of inland lakes and working closely with state officials.
- 2) All of our aquatic vegetation surveys and bottom hardness surveys utilize GPS technology such as the innovative BioBase® biovolume and side-scan sonar technology to precisely determine the depth contours, weed bed sizes, and locations of vegetation (Figures 1-2 below). In the feasibility study, we would utilize maps similar for Lake Leelanau.



Figure 1. A depth contour map of Lake Leelanau.

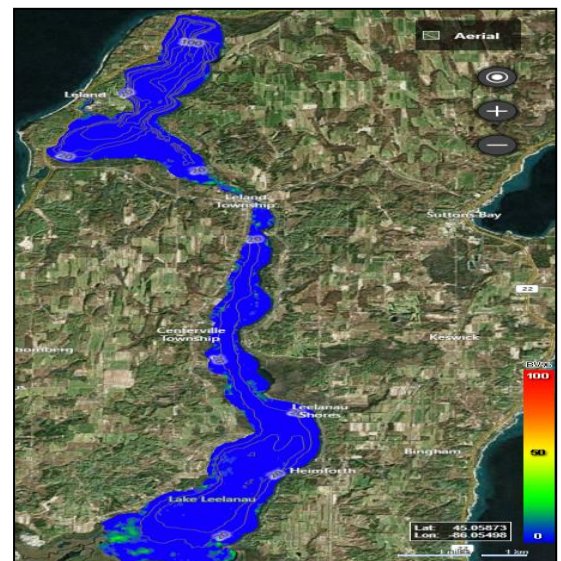


Figure 2. An aquatic vegetation biovolume map of Lake Leelanau.



Restorative Lake Sciences, LLC

- 3) Our staff has completed **over 200 lake management plans and reports** and regularly publish scientific articles in the lake management and research community. Combined, our staff has **over 150 years of expertise in lake research and management**. Our goal is to empower all Lake Leelanau stakeholders to be actively engaged in community outreach and project implementation for sustainable perpetuation of a successful lake management program. A few of our staff also teach at local universities and actively conduct lake research to stay well informed of key new findings.
- 4) We have a **Certified Professional Watershed Manager (Dr. Jennifer Jermalowicz-Jones)**, which qualifies us to properly manage the watershed and non-point source pollution issues around Lake Leelanau and work closely with the state and other key stakeholders to reduce the entry of pollutants and nutrients to the lake. We also have staff certified in stormwater and sediment control/erosion.
- 5) We have a **Licensed Professional Engineer (James F. Tiffany, PE)** who reviews our lake improvement feasibility studies, makes improvement recommendations, and stamps the report upon his acceptance.
- 6) We have a **Certified Lake Professional (Dr. Jennifer L. Jermalowicz-Jones, CLP)** that is only one of two in the State of Michigan (certified by the North American Lake Management Society).
- 7) We have a **Certified Michigan Natural Shoreline Professional (Grant L. Jones)** who is qualified to design and install soft, natural shorelines in Michigan.
- 8) Our staff serve on non-profit boards such as the **Michigan Lake and Stream Association (MLSA)**, and the **Michigan Chapter of the North American Lake Management Society (McNALMS)**.
- 9) We work closely with several aquatic contractor firms and are the only firm to offer **oversight of all management activities** on all of our lake programs. We see the value in this key service component as it allows for accountability for all involved and assures the Lake Leelanau community that the work is performed according to both performance and safety specifications for the best long-term outcome.
- 10) Our company has the **highest level of liability insurance** for a professional services firm.
- 11) **We work with numerous lake improvement boards in Michigan, under PA 451** of 1994, as amended, and have held create SAD's and facilitate public hearing processes as well as lake board formation.



Restorative Lake Sciences, LLC

12) We offer an independent, objective value to the Lake Leelanau community as we do not “vend” or function as salespeople but only high qualified professional lake scientists. All of our management decisions are based on the latest scientific research that is statistically-sound.

The Proposed Lake Leelanau Improvement Feasibility Study Deliverables:

The following components are recommended for a comprehensive lake assessment for Lake Leelanau in 2021, to be completed by August 15, 2021:

Lake Ecology/Management Background Information

- Introductory Concepts
- Lake Hydrology
- Biodiversity and Habitat Health
- Watersheds and Land Use

Lake Leelanau Physical & Watershed Characteristics

- The Lake Leelanau Basin (sediment hardness map (as shown above), other aerial maps, lake stats)
- Lake Leelanau Extended and Immediate Watershed (maps included)
- Lake Leelanau Land Use and Shoreline Soils and Impacts on Water Quality (maps and explanations for water quality due to soils around the lake)

Lake Leelanau Water Quality (collected as profile from surface to bottom at top, middle, bottom depths for n=3 deepest basins for each parameter). NOTE: This data will be additional to the data supplied by the Association and all data will be presented in the feasibility study report.

Water Quality Parameters:

- Dissolved Oxygen, % Saturation
- Water Temperature
- Specific Conductivity
- Turbidity, Total Dissolved, and Total Suspended Solids
- pH
- Total Alkalinity
- Total Phosphorus and Ortho-Phosphorus
- Total Kjeldahl Nitrogen and Total Inorganic Nitrogen (ammonia, nitrate, nitrate forms)
- Chlorophyll-*a* and Algae Composition (a breakdown of good vs. bad algae and genera)
- Zooplankton (critical parameters for lake fishery food chain assessment)
- Secchi Disk Transparency
- Sediment Organic Matter (collected in 5 locations)
- Sediment macroinvertebrates (collected in 3 locations)

Lake Leelanau Aquatic Vegetation Communities: Includes all maps (and biovolume)

- Lake Leelanau Exotic Aquatic Macrophytes
- Lake Leelanau Native Aquatic Macrophytes



Restorative Lake Sciences, LLC

Lake Leelanau Invasive Aquatic Plant Management Improvement Methods (Note:

These are discussed with benefits, disadvantages, and best recommended methods):

- Aquatic Herbicides and Applications
- Mechanical Harvesting
- Benthic Barriers and Nearshore Management Methods
- Diver Assisted Suction Harvesting
- Dredging
- Laminar Flow Aeration and Bio augmentation
- UV Light and other Innovative Methods

Lake Leelanau Additional Improvement Recommendations (discussed in report)

- Leelanau Lake Watershed Management
 - Leelanau Lake Erosion and Sediment Control
 - Leelanau Lake Nutrient Source Control
- Invasive Aquatic Species Prevention
 - Zebra Mussels and Other Invasives

Lake Improvement Financing Options

Discussion on Economic Impact per PA 451

Cost Estimates for Lake Leelanau Improvements/Community Recommendations for long-term lake improvements

Scientific References



Restorative Lake Sciences, LLC

RLS proposes to develop a comprehensive lake improvement feasibility report for the Lake Leelanau community at a cost of \$12,000 which could be paid according to the following payment schedule: 50% of the total upon acceptance and signing of this contract (\$6,000), 50% (\$6,000) upon total completion/delivery of the Lake Leelanau study report.

RLS could have the report completed by August 20, 2021 as requested. This is a short time frame, but RLS is willing to meet this deadline.

We appreciate the opportunity to submit this scope of work to the Board of Commissioners of Leelanau County and to the board of the Lake Leelanau Lake Association.

Lastly, we welcome the opportunity to provide excellent scientific expertise to the Lake Leelanau community. Our goal is to empower all residents to better care for the lake in the short term and in the long term.

Sincerely,

Dr. Jennifer L. Jermalowicz-Jones, CLP (Cert # 21-01P)
Certified Professional Watershed Manager (MSU)
Restorative Lake Sciences, LLC
18406 West Spring Lake Road
Spring Lake, MI 49456
616.843.5636
jenniferj@restorativelakesciences.com
<http://www.restorativelakesciences.com>

If Accepted:

Name of Leelanau County Official: _____

Signature of Leelanau County Official: _____

Date: _____